CLAIMS

1. A process for isolating milk proteins from milk or whey comprising the following steps:

a) the milk or the whey is sterilized and defatted;

b) the milk fraction derived from step a) is passed over a cation-exchange resin conditioned in an elution column;

c) the fraction retained on the resin is eluted with an aqueous salt solution;

d) the eluate resulting from step c) is desalted and sterilized.

This process being characterized in that:

α) the cation-exchange resin is a resin grafted onto strong acid functional groups;

the parameter BV denoting the ratio of the volume of raw material to the volume of wet resin in the column,

the parameter SV denoting the ratio of the rate of feeding the column to the volume of wet resin in the column,

the parameter LV denoting the ratio of the rate of feeding the column to the section of the column,

β) during step b), the binding parameters have the following values:

- BV_f is between 5 and 400;
- SV_f is between 2 and 40 h^{-1};
- LV_f is greater than or equal to 1 m/h and less than or equal to 5 m/h.

γ) during step c), the elution parameters have the following values:

- BV_e is between 1.5 and 7;
- LV_e is less than 1 m/h.

2. The process as claimed in claim 1, characterized in that the starting material is cows' milk.

3. The process as claimed in claim 1, characterized in that the starting material is a casein acid whey.

4. The process as claimed in any one of the preceding claims, characterized in that the cation-exchange resin is a resin grafted by acid functional groups with a pKa ≤ 2 having an ion-exchange capacity of between 200 and 1000 μE/ml.

5. The process as claimed in claim 4, characterized in that the resin is grafted by sulfonate salt or sulfonic acid functional groups.

6. The process as claimed in claim 5, characterized in that the resin is grafted by propyl sulfonate or propylsulfonic functional groups.

7. The process as claimed in any one of the preceding claims, characterized in that the particle size of the resin is between 100 μm and 900 μm, preferably between 200 and 750 μm, still more preferably between 250 and 600 μm.

8. The process as claimed in any one of the preceding claims, characterized in that during step b) of binding of the raw material, one or more of the following conditions are met:

- BV_f is between 80 and 150;
- SV_f is between 5 and 40 h^{-1};
- LV_f is between 3 and 4.3 m/h.

9. The process as claimed in any one of the preceding claims, characterized in that the following conditions are met

during step b):

- BV_f is between 80 and 120;
- SV_f is between 8 and 15 h^{-1};
- LV_f is between 3 and 4.8 m/h.

during step c):

- BV_e is between 3 and 7;
- LV_e is less than 1 m/h.

10. The process as claimed in any one of the preceding claims, characterized in that during step b), the resin is conditioned in a column whose temperature is kept between 2 and 15°C.

11. The process as claimed in any one of the preceding claims, characterized in that during step c) for elution of the bound proteins, at least one of the following conditions is met:

- BV_e is between 3 and 5;
- LV_e is less than 0.5 m/h.

12. The process as claimed in any one of the preceding claims, characterized in that during step c), the resin is conditioned in a column whose temperature is kept between 2 and 15°C.

13. The process as claimed in any one of the preceding claims, characterized in that the aqueous saline solution used for carrying out the invention is a solution of a chloride of an alkali metal chosen from K+, Na+, Ca+, Mg+.

14. The process as claimed in claim 12, characterized in that the aqueous saline solution is an aqueous sodium chloride solution.

15. The process as claimed in claim 14, characterized in that the aqueous saline solution has a concentration of between 2 and 25% by weight of salt per weight of liquid.

16. The process as claimed in claim 14, characterized in that the aqueous saline solution has an ionic strength of between 1 and 2 M.

17. The process as claimed in any one of the preceding claims, characterized in that the pH of the aqueous saline solution for elution is between 6 and 7, advantageously between 6.5 and 7.

18. The process as claimed in any one of the preceding claims, characterized in that the desalting is carried out by ultrafiltration and diafiltration.

19. The process as claimed in claim 18, characterized in that the ultrafiltration and diafiltration treatments are carried out until a permeate having a conductivity of less than 15 mS is obtained.

20. The process as claimed in any one of the preceding claims, characterized in that the sterilization is carried out by microfiltration.

21. The process as claimed in any one of the preceding claims, characterized in that the desalted and sterilized product is dried so as to obtain the milk fraction derived from the process of the invention in the form of a powder.

22. A milk protein fraction, characterized in that it can be obtained by the process according to any one of claims 1 to 21.

23. A milk protein fraction, characterized in that it corresponds to the following characteristics:

- a protein content of greater than 90%,
- a mineral salt content of less than 1%,
- a fat content of less than 1%,
- a lactose content of less than 1%,
- a moisture content of less than 5%,
- a lactoferrin content of less than 80%,
- a pH in solution at 2% of between 6 and 7.5,
- a UV-visible spectrophotometric purity defined by an OD^{412}/OD^{280} ratio <0.15,

- contains at least 1% of proteins having an isoelectric point greater than or equal to 8,

the percentages being given by weight relative to the weight of dry matter content of the milk fraction according to the invention.

24. The milk protein fraction as claimed in claim 23, characterized in that it corresponds to at least one of the following characteristics:

- a protein content of greater than 95%,
- a mineral salt content of less than 0.5%,
- a fat content of less than 0.5%,
- a lactose content of less than 0.5%,
- a moisture content of less than 4%,
- a lactoferrin content of less than 80%,
- a pH in solution at 2% of between 6 and 7.2,
- a UV-visible spectrophotometric purity defined by an OD^{412}/OD^{280} ratio <0.1,
- contains at least 1% of proteins having an isoelectric point of between 8.2 and 8.7.

25. The milk protein fraction as claimed in any one of claims 22 to 24, characterized in that it is derived from cows' milk.

26. The milk protein fraction as claimed in claim 25, characterized in that it comprises at least 40% of proteins having an isoelectric point greater than or equal to 8.

27. The milk protein fraction as claimed in claim 25 or claim 26, characterized in that it comprises a lactoferrin content greater than or equal to 30% and a lactoperoxidase activity greater than or equal to 120 ABTS units per mg of isolate.

28. The milk protein fraction as claimed in any one of claims 22 to 24, characterized in that it is derived from a casein acid whey.

29. A combination of a milk protein fraction according to any one of Claims 22 to 28 with calcium.

30. The combination as claimed in claim 29, characterized in that it additionally comprises vitamin D.

31. A food composition, characterized in that it comprises a milk protein fraction according to any one of claims 22 to 30.

32. A dietary kit comprising a powder of milk protein fraction as claimed in any one of claims 22 to 30.

33. The use of a milk protein fraction as claimed in any one of claims 22 to 30, for the preparation of a dietary milk.

34. The use of a milk protein fraction as claimed in any one of claims 22 to 30, for the preparation of a food intended for the prevention of a pathology selected from: growth retardation, osteoporosis, bone fragility, bone fractures, rheumatism, osteoarthritis, periodontal diseases, and intestinal barrier deficiency.

35. The use of a milk protein fraction as claimed in any one of claims 22 to 30 for the preparation of a food intended to promote the growth of osteoblasts and/or of intestinal cells and/or to inhibit the growth of preosteoclasts.

36. A pharmaceutical composition, characterized in that it comprises at least one milk protein fraction as claimed in any one of claims 22 to 30 and a pharmaceutically acceptable carrier.

37. The use of a milk protein fraction as claimed in any one of claims 22 to 30, for the preparation of a medicament intended for the prevention and/or treatment of a pathology selected from: growth retardation, osteoporosis, bone fragility, bone fractures, rheumatism, osteoarthritis, periodontal diseases, and intestinal barrier deficiency.

38. The use of a milk protein fraction as claimed in any one of claims 22 to 30, for the preparation of a medicament intended to improve the absorption of calcium in the body.

39. The use of a milk protein fraction as claimed in any one of claims 22 to 30 for the preparation of a medicament intended to promote the growth of osteoblasts and/or of intestinal cells and/or to inhibit the growth of preosteoclasts.

40. A hygiene product, characterized in that it comprises at least one milk protein fraction as claimed in any one of claims 22 to 30.